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ABSTRACT

Intended for librarians and teachers, this guide describes a library instruction program for teaching subject analysis to middle and high school students. The program is comprised of three units: subject analysis, classification scheme construction, and subject headings. Background material for the librarian, exercises for students, and answers to the questions asked are part of each section. (FM)

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TEACHING SUBJECT ANALYSIS TO HIGH SCHOOL STUDENTS AS A MEANS OF IMPROVING THEIR RESEARCH SKILLS

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INTRODUCTION

Scenario: A high school student enters the library to begin work on a term paper. The librarian, wanting to help, asks what his topic is. The answer, as expected, is a broad subject, and the student is uneasy. Clearly he has not the least notion of how to approach the library's vast resources. The librarian realizes with a sinking feeling that it will be necessary to analyze the subject with the student before he can proceed. The depression comes not from job ennui or a shirking of duty but rather from past experiences which havebeen draining. This student is probably the most enthusiastic member of his class; behind him in various stages of reluctance are the other students for whom the librarian will have to duplicate the process.

What to include in library education for middle and high school students is a subject often debated formally and informally by librarians without ever reaching a consensus. Manuals purporting methods of orienting oneself in a library and programs for teaching reference materials are available. In them all is the implicit hope that the student will be able to transfer the skills and knowledge he has acquired in research to future assignments. As adept as he may be at finding quick answers in reference works, however, he still may flounder when confronted with a 20 page paper on the Civil War. Something is missing; it is an understanding of the structures of subjects. His library education has assumed that his developing mind knows a priori how to perform a sophisticated operation which has occupied many distinguished minds in the literature of library science, subject analysis.

The goal of this paper will be to attempt to fill this void and to present subject analysis in such a way that a student can begin his research with

more than just the technical skills in his repertoire; he will have done the thinking about his subject that is necessary before one notecard can be written. The program has been designed for use with high school students. Younger children are usually given specific topics for reports and also may not be able to deal with subjects abstractly. They need to develop the skills for using and a familiarity with various kinds of reference materials. Having completed that process and put their knowledge to practice in simulated "research," they will then be ready to analyze subjects and create "islands of order"[1] in the midst of chaos.

Three units comprise the program: subject analysis, classification scheme construction, and subject headings. Background material for the librarian, exercises for the students, and answers to the questions asked are part of each section. The program is intended as an outline for the study of subject analysis rather than a definitive course. Relevance is of paramount importance in high school library education. By adjusting the scope and depth of each unit, by working through each exercise with students, the librarian can amplify and enrich the bare structure. Section 3, for example could be expanded with more detailed work on subject headings and lead into a unit on search strategy.

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[1] Anatole Rapoport, "What is information?" in Introduction to Information Science, ed. by Tefko Saracevic (New York: Bowker, 1970), p. 11.

BACKGROUND ON SUBJECT ANALYSIS

Subject analysis has occupied some of the great minds in library science: Cutter, Dewey, Kaiser, Ranganathan. The field is complex and sophisticated because it is "inextricably intertwined with the understanding of how we think, how we conceive concepts, how we communicate them, how we record them, how we save them for future use, how we use them, and how we reuse them in unlimited permutations and combinations to synthesize or conceive of new ones. It is an intriguing cycle."[2] For students to be able to do effective research, it is necessary for them to know about the relationships which exist between subjects, to put together some of those permutations and combinations so that they can perhaps put together new ones in the course of their academic journeys. They do not have to order the world as Ranganathan or Kaiser did, but they should be aware that various orders exist. An imaginative mind will look for new orders or will test the old ones to affirm their validity. This is the student's continuing task. This is what his teachers want to see in his work instead of the parroting of dead sages.

Any basic class of subjects can be analyzed into a limited number of groups called facets according to S.R. Ranganathan. These facets represent particular aspects of a subject and can be further broken down into foci (singular, focus) or specific topics. A compound subject can consist of 2 foci from different facets but not from the same one. To identify a facet means to look at a subject from a special viewpoint. Some of these viewpoints include the chronological, the evolutionary, increasing complexity, decreasing concreteness, the spatial or geographical, the canonical, the alphabetical, purpose-product, cause-effect, and whole-part. In the following exercise students

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[2] David Liston, "Subject analysis," Annual Review of Information Science and Technology, 12, American Society for Information Science (White Plains, N.Y.: Knowledge Industry Publications, 1977), p. 102.

will be asked to identify facets in subjects with the hope that they will begin to see that there are many ways in which to approach a subject, some of which are more appropriate to particular fields of knowledge than others.

MEANINGFUL RELATIONSHIPS; OR AN INTRODUCTION TO SUBJECT ANALYSIS

In order to do effective research it is necessary to understand the various types of relationships which can exist between subjects. Subjects do not stand in isolation from each other any more than people do. There are many connections, similarities, and differences between them. Subjects can be considered from a variety of viewpoints; combining these viewpoints results in more complex subjects. It is a never-ending cycle. The purpose of education is learning to detect these interrelationships, not only specifically in each discipline, but also among disciplines. To achieve this is to give order to life.

A subject can be considered from the viewpoint of:

1. Chronology. Observations can be made from the viewpoint of time. Patterns can be detected, not only in man's history, but also in the history of things such as literature and science: hence the phrases, "History repeats itself" and "the lessons of history." Operations can also be considered sequentially as in the production of yarn or automobiles.
2. Evolution. Subjects, especially in the biological sciences, can be seen from an evolutionary viewpoint. Tracing the development of a species or a human feature such as the thumb would entail detecting similarities in nature.
3. Increasing Specificity To proceed from a basic idea to a more complex one is a common way of dealing with many subjects. Each level is more specific than the last. Indeed the Decimal System of Melvil Dewey is based on this idea. For example, 500 is the Dewey number for Pure Science; 510 is for Mathematics, 512 for Algebra.
4. Size. Within many areas of knowledge are relationships of size. Musical forms, such as solos, duets, trios, etc. fall into this category as do governments from villages to nations with all of the obvious steps between.

5. Spatial relationships are evident in geographical places or in methods of transportation such as those which function on the ground versus those which function on water, in the air or in space.
6. Canonical. This is a relationship of traditional order, such as the books of the Bible or the Heat - Light - Sound sequence usually adhered to in Physics textbooks.
7. Alphabetical. The cornerstone of library organization orders subjects, placing them into yet another unique arrangement. For students seated in alphabetical order the distance between them and the blackboard is determined as is adjacency and often the pattern of responses given to the lessons. The fields of Biography and Literature lend themselves to the alphabetical arrangement.

Action can be detected in more complex relationships between subjects considered from the following points of view:

8. Purpose - Product: In technology a subject can usually be analyzed into a purpose - product relationship as in Agriculture and Crops.
9. Cause - Effect: These relationships denote action and can be applied to subjects in history, the social sciences, science and technology.
10. Whole - Part: All of nature can be structured in terms of whole and parts as evident in taxonomy, the classification of plants and animals. Genus/species relationships fit this category.

Identify the following subject relationships by placing the number of the appropriate category beside each combination of terms.

A. Arithmetic - Geometry - Euclidean 3

B. Regional - State - Provincial 4

C. Germany - Italy - Japan, the Axis countries 5

D. Libraries in England versus Libraries in the United States 5

E. Smoking - Cancer 9

F. Nathaniel Hawthorne, John Steinbeck, Evelyn Waugh 7

G. African folk songs, French folk songs 5

H. Word - Sentence - Paragraph 3

I. The Torah 6

J. Java, Cro-Magnon, Neanderthal, Rhodesian, Peking 2

K. Car - Steamship - Rocket 5

L. War of 1812 - Civil War - Spanish-American War 1

M. Interior Decoration - Upholstery - Slipcover 3

N. Plant - Flower - Leaf 10

O. Sewing - Dress 8

Give two examples of your own.

P._____

Q._____

BACKGROUND ON DEVELOPING A SCHEME OF KNOWLEDGE

With practice students should become proficient at identifying various relationships among subjects. Until they place the subjects into the relationships, however, they will have experienced only part of the process. For complete understanding to take place, they must develop their own scheme of knowledge.[3] It is the intent of this section to simulate that process.

The first step will be to examine the literature of a subject. Music has been selected because it is composed of various facets and because most students have some familiarity with it. On a more sophisticated level an examination of the literature would include consulting an abstracting or indexing service. For this exercise, however, titles were chosen from the shelf list of a small school library with a diverse music collection. The students will select concepts from the titles, group them into facets, and decide the citation order in which they should be arranged in the "schedule." The goal of the section is the students' understanding that what they are doing for music must be done for all fields of knowledge. They should also have an appreciation for the precision of both classifications and classifiers and begin to sense the vastness and depth of a library's resources. The hierarchical system of Dewey and the grouping of words according to ideas of Roget's Thesaurus may be compared. The concept of specificity should be stressed.

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[3] A. C. Foskett, The Subject Approach to Information (Hamden, Conn.: Linnet Books, 1972; 2d ed.), p. 111.

CONSTRUCTING A CLASSIFICATION SCHEME

In the first unit subjects were considered according to viewpoint or facet, two or three terms at a time. In this unit one subject, music, will be considered in oepth. Many facets relating to the general subject will be identified, grouped, and arranged in order of importance. At the conclusion of the exericse a systematic arrangement for music will have been created. Careful study of the system will display the depth or degree of specificity with which it would be possible to plumb the subject, an important fact for the effective researcher to remember. This process simulates the procedure followed by creators of schemes of knowledge for every subject.

The following titles represent the "Literature" of Music from which a classification scheme will be constructed.

1. Conducting choral music.
2. The classical style; Haydn, Mozart, Beethoven.
3. An introduction to twentieth century music.
4. Listen; a guide to the pleasures of music.
5. Classic and romantic music.
6. A history of western music.
7. What music is.
8. Listening to the orchestra.
9. How to make a hit record.
10. Carillon music and singing towers of the old world and the new.
11. Music in Europe and the United States; a history.
12. Inside jazz.
13. The Victor book of the symphony.
14. The Nativity play, or Christmas cantata.
15. Black music in America.
16. Stories of the world's great operas.
17. The story of rock.
18. How music grew; from prehistoric times to the present day.
19. Celebrating the Duke, and Louis, Bessie, Billie...and other heroes.
20. The history of Catholic Church music.
21. The Beatles; an illustrated record.
22. The art of ragtime; form and meaning of an original black American art.
23. All the years of American popular music; a comprehensive history.
24. The big bands.
25. Great symphonies; how to recognize and remember them.
26. National anthems.
27. Golden guitars; the story of country music.

Group the literature into facets (i.e. viewpoints), referring to the list in Unit 1. More than one facet can be present in one title.

Facets of Music:

Chronology	Kinds	Spatial	Composers	Instruments	Performers
20th century	choral	western	Mozart	orchestras	Armstrong, L.
Classical	carillon	Europe	Haydn	towers,	Ellington, D.
romantic	jazz	U.S.	Beethoven	singing	Smith, B.
prehistoric	symphony			bands	Holliday, B.
	cantata			guitars	Beatles
Operations	opera			records	
	rock				
conducting	church				
listening	ragtime				
recording	popular				
	anthems, national				
	country				
	black				

Kinds can be further subdivided:

Vocal	Instrumental
opera	Classical
choral	
cantata	symphonies
anthems, national	church
	carillon
	Popular
	Black
	jazz
	ragtime
	rock
	country

Specificity is a basic library principle. A system of classification should show not only the subjects, but also the relationships between them in order to achieve this.[4] The system should begin with the general concepts and move downward with each successive level more detailed than the one above it. It is necessary to decide the order in which to list the facets so that they are logically arranged. This is done by identifying the most important facet, the next most important facet, etc. If a pattern can be maintained throughout the schedule, users will begin to recognize it.

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[4] Ibid., p. 43.

Decide which facet is the most important, the next most important, etc. Re-arrange the facets accordingly. (One scheme might be: Things - Kinds - Parts - Materials - Properties - Processes - Operations - Agents.)

Music

- Kinds
  - Vocal
    - opera
    - choral
      - cantata
      - anthem, national
  - Instrumental
    - Classical
      - symphonies
      - church
      - carillon
    - Popular
      - Black
        - jazz
        - ragtime
      - rock
      - country
- Instruments
  - orchestras
  - bands
  - guitars
  - singing towers
  - records
- Chronology
  - prehistoric
  - classical
  - romantic
  - 20th century
- Spatial
  - western
  - Europe
  - United States
- Operations
  - conducting
  - listening
  - recording
- Composers
  - Beethoven
  - Haydn
  - Mozart
- Performers
  - Armstrong, Louis
  - Beatles
  - Ellington, Duke
  - Holliday, Billie
  - Smith, Bessie

BACKGROUND ON THE APPLICATION OF SUBJECT ANALYSIS TO RESEARCH

Students need and often demand that their education be relevant to their experience. They want to put their knowledge to work now. By only teaching themthe principles of subject analysis and of classification, the demand for relevance will not be met. The application of subject analysis to research must be given to complete the process, or else students will find themselves in the same situation as before, having skills and knowledge for which they see no purpose. The products in this program are not young minds newly attuned to subject relationships or newly appreciative of classification schemes, but new researchers ready to tackle knowledge and find new meanings which will further civilization. Lofty and earnest as these goals are, satisfaction and fun have more immediacy.

Subject analysis and classification lead directly into subject headings and the subject catalog, the foci of this unit. Both tend to be glossed over, perhaps because of their complexities in introductory lessons on the card catalog. Librarians are grateful if students master the alphabetical arrangement. If they do not also concentrate on helping the students to become familiar with the principles of subject headings, many relevant documents will remain hidden in the catalog. Students compensate for their lack of familiarity by remembering the shelves where books on their interests can be found, and they are not alone. How many teachers have ruefully admitted that they never use the card catalog? However, being able to use it effectively is a vital tool to have in one's repertoire of research skills. Knowing how to use atlases, dictionaries, and the rest of the important reference materials is "the frosting on the cake." The core of the library is the book collection, and the catalog is the key to unlocking that vast resource.

Now that the students have a better understanding of how detailed a subject can be, they will appreciate the basic rule of subject headings formulated by Charles Ammi Cutter in 1876, specific entry. And if they have ever felt frustrated with the catalog, they will also appreciate his second tenet: common usage. Usage "is the supreme arbiter, the usage not of the cataloger but of the public in speaking of subjects."[5] Both should be emphasized to counter the frequent criticism of libraries, that they are arranged solely for the benefit of librarians. While theories of library science can be as intellectually stimulating as those in other disciplines, in the field common sense is evident in many operations. The public relations problem occurs when librarians do not educate their users either formally or informally of the common sense approach. Perhaps the exercises which follow will dispel some of the mystery.

See and see also references assume greater importance once students understand subject headings more clearly. Just as subjects are related, the indexing terms which are their surrogates are also related. There are preferential connections leading from an unallowed term to an authorized one; hierarchical relationships of the genus/species, whole/part, broad/narrow kinds; and affinitive relations which refer from one authorized term to another nonhierarchical, authorized one. A student embarking on a research project should spend considerable time working out a search strategy derived from terms used in his library before going to the actual card catalog. The Sears list of subject headings has been chosen for this program because of its accessibility in school libraries. Since its terms resemble 40% of those in the Library of Congress list, students will simultaneously receive training for their college research.[6]

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[5] Jessica Harris, Subject analysis; computer implications of rigorous definition (Metuchen, N.J.: Scarecrow, 1970), p. 31.

[6] Ibid., p. 25.

HOW TO USE SUBJECT ANALYSIS FOR RESEARCH

In 1876 a famous librarian, Charles Ammi Cutter, set forth a set of principles which has guided the philosophy of libraries ever since. The principles apply to subject headings, those terms which describe what a book is about, both on the catalog card where they are listed at the bottom (i.e. tracings) and in the card catalog in captial letters across the tops of the subject cards. (Figure 1.)

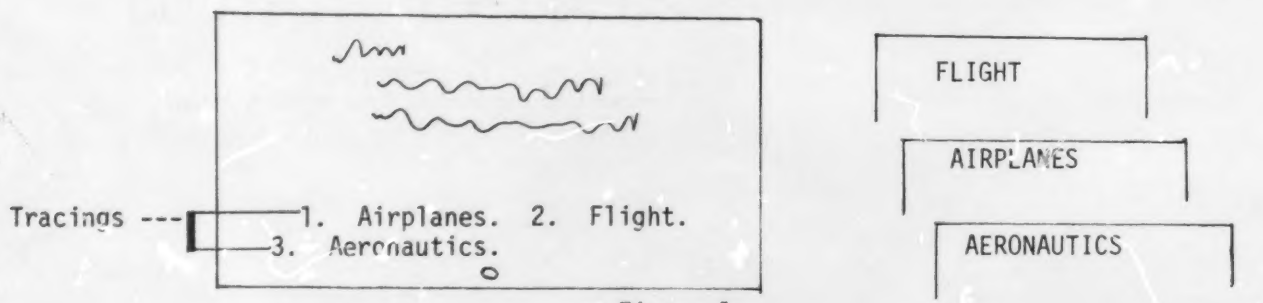

Figure 1.

For a student attuned to subject relationships many of these principles will have great relevance for research because they give directions for forming the terms under which he will find appropriate material. In school libraries these terms are listed (modified from Cutter's original set) in Sears List of Subject Headings. In larger libraries both public and academic, the Library of Congress List of Subject Headings is used. There are many similarities between the two, but because of its accessibility, instruction will be given for the Sears list.

The facets of a subject must be converted from the natural language of the researcher to the controlled vocabulary of the subject heading list. It is the same procedure followed when using indexes in books and encyclopedias. However, the controlled vocabularies may vary from book to book, encyclopedia, etc. because they are usually based on the terms coined by the individual authors. There is uniformity in the terms used in card catalogs since they

are usually based on one of two standard lists. Read each of the principles below, study the sample, and then answer the questions using the Sears list.

Principles of Subject Headings:

I. Specific Entry: Of all the principles attributed to Cutter, this is the most important. For the researcher it means deciding on the narrowest facet of interest and moving toward the broadest. Look under COMPOSERS rather than under MUSIC.

Which term is the most specific?

1. ASTRONOMY or PLANETS_____
2. BOTANY or NATURAL HISTORY_____
3. RIFLES or FIREARMS_____
4. DRAMA or LITERATURE_____
5. LIVESTOCK or CATTLE_____

II. Common Usage: While subject headings are controlled vocabularies, they usually reflect expressions normally used by the majority of library patrons. Outdated terms are replaced with more relevant ones after a proving period. Current American spelling and terminology are preferred unless a foreign term has become part of the language. Look under HOME ECONOMICS not DOMESTIC ECONOMY.

Use the Sears list to determine which of the following terms is acceptable. (acceptable terms appear in boldface type.)

1. CANCER or CARCINOMA_____
2. ICHTHYOLOGY or FISHES_____
3. NUMISMATICS or COINS_____
4. LAISSEZ FAIRE or INDUSTRY AND STATE_____
5. NEGROES or BLACKS_____

III. Singular versus Plural: Relevant entries may be missed if the researcher does not consider a subject in singular and plural terms. Plural is preferred, but both are used, singular for abstract ideas, concepts or actions,

plural for objects and things. Look under THEATERS and THEATER.

Find examples of singular and plural terms in Sears.

1. ART and ARTS
2. DRUGS and DRUG ABUSE
3. OPERA and OPERAS

IV. Uniformity and Preferred Headings: The researcher should be able to count on his subject being listed in one place in the catalog, if possible. To achieve this, one term must be selected from a group of synonyms and designated as the preferred term. However, if the researcher pursues a synonym, he will receive instructions to see the chosen terms. RIME see RHYME.

What is the preferred subject heading for the following unauthorized term?

1. BOOTS see _____
2. CIVIL WAR--U.S. see _____
3. AFRICAN CIVILIZATION see _____
4. GRAVEYARDS see _____
5. MAGAZINES see _____

V. Geographic Names: A subject may be subdivided by place, especially in the fields of science, technology, economics, education, and the arts. A place may also be subdivided by subject in the fields of history, geography, politics, and the social sciences. Look under PARIS--POPULATION and POPULATION.

What subdivisions can be made under UNITED STATES?

1. U.S.--_____
2. U.S.--_____
3. U.S.--_____

Give 3 examples of subjects which can be subdivided by place.

1._____
2._____
3._____

VI. Compound Headings: Closely related subjects which are usually treated together receive a compound heading separated by the word, "AND." Look under BOATS AND BOATING: GOOD AND EVIL. For subjects which are closely related but which are independent, each is listed in the catalog, but directions are given to consult the other through see also references. The relationship between these two subjects is affinitive. Look under POTTERY see also GLAZES; PORCELAIN; TERRA COTTA; TILES; VASES.

Give the see also references for the following authorized terms:

1. PORTRAITS see also _____
2. MASONRY see also _____
3. DIVING see also _____
4. NARCOTICS see also _____
5. TELEVISION see also _____

VII. Inversion of Headings: When a phrase consisting of a noun preceded by an adjective is rearranged so that the noun comes first followed by a comma and the adjective, the researcher will find material on his subject subdivided into facets. Often there is a hierarchical relationship, general to specific, broad to narrow, between the two terms similar to that found in a classification schedule. Look under FOLKLORE, BLACK; FOLKLORE, ESKIMO, etc.

Which phrases does the Sears list invert?

1. Elementary Education
2. Decorative Art
3. Collective Bargaining
4. American Furniture
5. International Law

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